From Technologies to IP Business Intelligence

MEMS

Sensors & Actuators

2019 Patenting Activity

July 2020

KnowMade
Patent & Technology Intelligence

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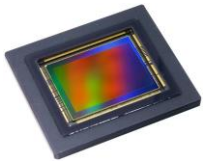
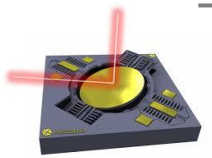
SCOPE OF THE REPORT

MEMS devices included in the report



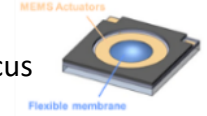
CMOS image sensor

Microbolometers



Micromirrors

Sight

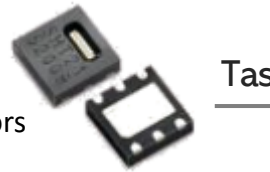


Autofocus

Focus

Gas sensors (VOC, CO, CO2, NOx …)

Smell

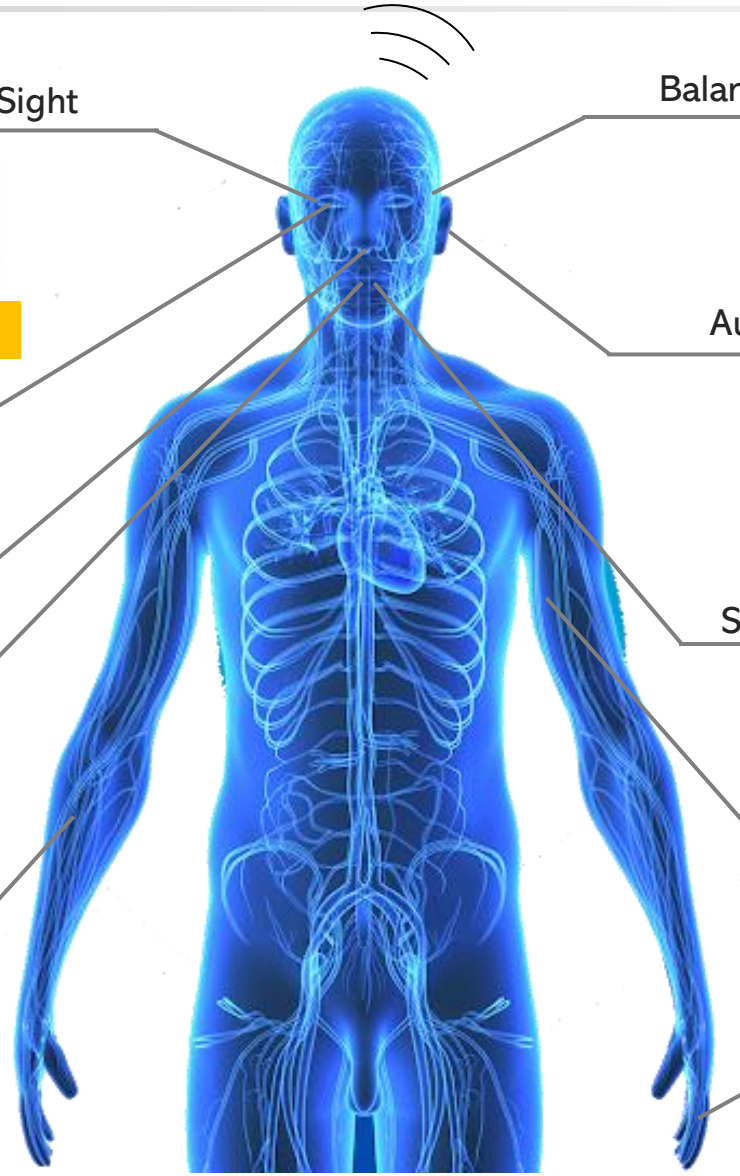


Humidity sensors

Taste

Microfluidics
(micropump, microvalve, etc.)

Fluids

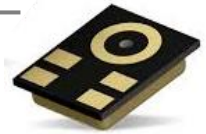


RF communication
(oscillators, tuners, switches, filters)

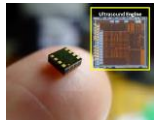
Balance

Inertial sensors
(accelero, gyro, IMU, magneto)

Audio



Microphones



Ultrasonic

Speech

Microspeakers

Pressure

Pressure sensors

Touch

Force, haptic & touch sensors

SCOPE OF THE REPORT

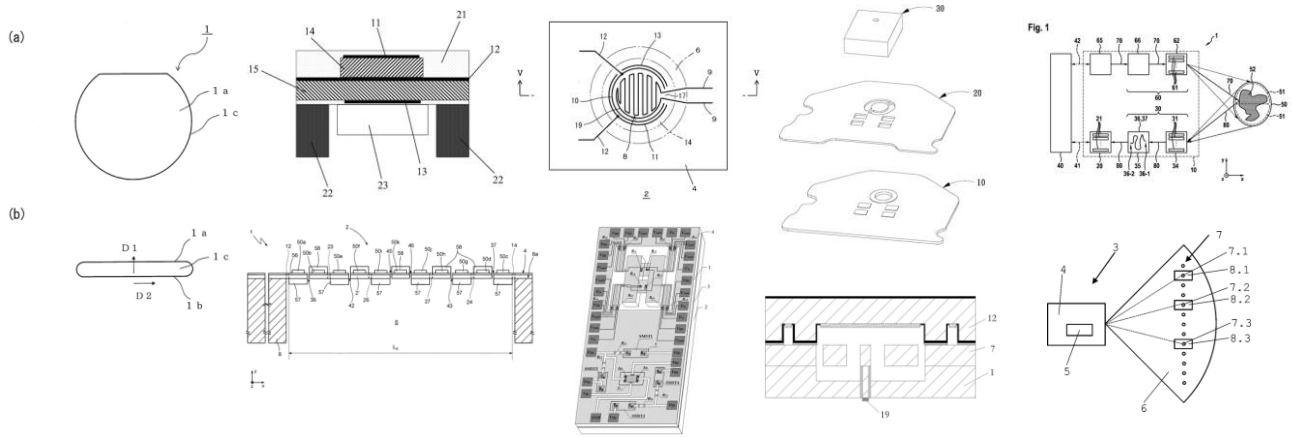
- This report provides a detailed picture of the **2019 patenting activity for MEMS sensors and actuators, including inertial sensors (accelero, gyro, IMU), microphones, microspeakers, ultrasonic sensors, pressure sensors, micromirrors, microbolometers, gas sensors**. We have selected patents published in 2019 specifically related to **MEMS transducers**, **MEMS devices** and **MEMS packaging**. All other patents related to materials, wafer manufacturing, driver circuits and systems have been excluded.
- This report covers **patents published worldwide** between January 1st 2019 and December 31st 2019. We have selected and analyzed more than **4,300 patents** grouped in more than **3,000 patent families** relevant to the scope of this report.

Example of patent	Selected	Not selected
Patents related to MEMS transducers or actuators and with a first publication date in 2019.	X	
Patents related to sensors or actuators, specifically claiming the use of a MEMS process, and with a first publication date in 2019.	X	
Patents related to material growth/deposition, specially developed for MEMS devices, and with a first publication date in 2019.	X	
Patents relates to MEMS technology with a first publication date prior to 2019.		X
Patents related to sensors or actuators which do not use MEMS technology.		X

Scope of the report

inertial sensors, accelero, gyro, IMU, microphones, microspeakers, ultrasonic sensors, pressure sensors, micromirrors, microbolometers, gas sensors

Material | **Transducers** | **Devices** | **Packaging** | **System**

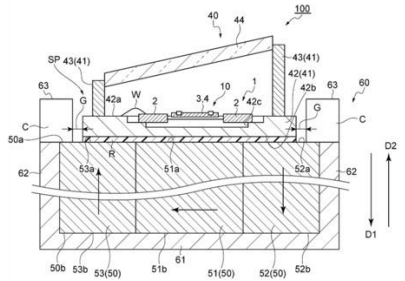


KEY FEATURES OF THE REPORT

- ✓ The report provides a **global view of the most recent patents published in 2019** by MEMS players, the main **patent applicants**, their IP **collaborations**, an understanding of their **patented technologies** and related R&D developments.

- ✓ Due to the 12-18 months delay between the patent filing and its publication, the **patents published in 2019** give us information on **R&D activity and innovations** that were developed in 2017-2018.

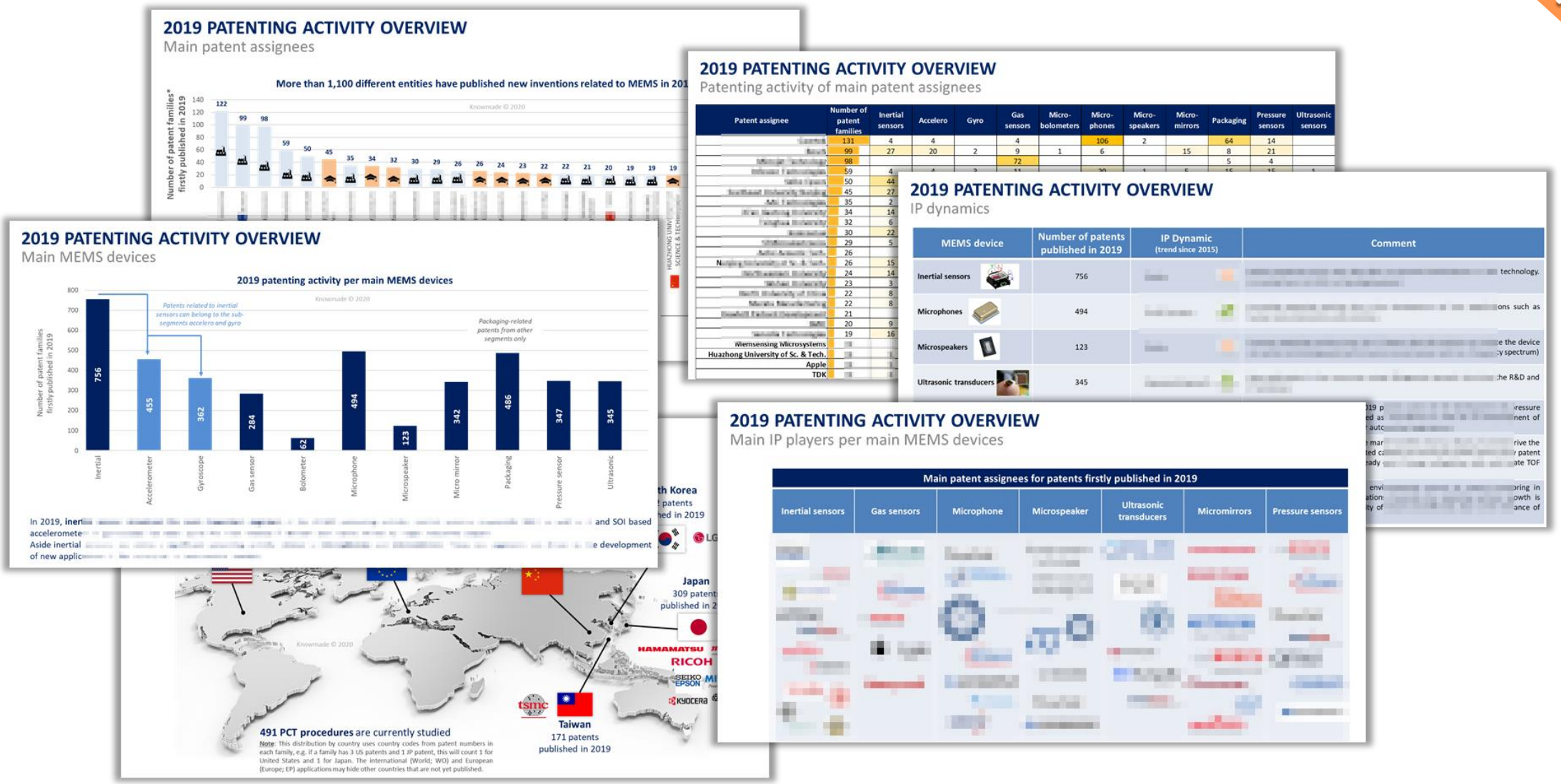
- ✓ The report also provides an extensive **Excel database** with **all patents** analyzed in the report (>4,300 patents), including **application and technology segmentation**. This **useful patent database** allows multi-criteria searches, including dates and numbers of priority/application/publication/grant, title, abstract, claims, patent applicants, current assignees, inventors, hyperlinks to original documents.



Disclaimer: This report **does not provide** any insight analyses or counsel regarding **legal aspects** or the **validity** of any individual patent. KNOWMADE is a research firm that provides technical analysis and technical opinions. KNOWMADE is not a law firm. The research, technical analysis and/or work proposed or provided by KNOWMADE and contained herein is not a legal opinion and should not be construed as such.

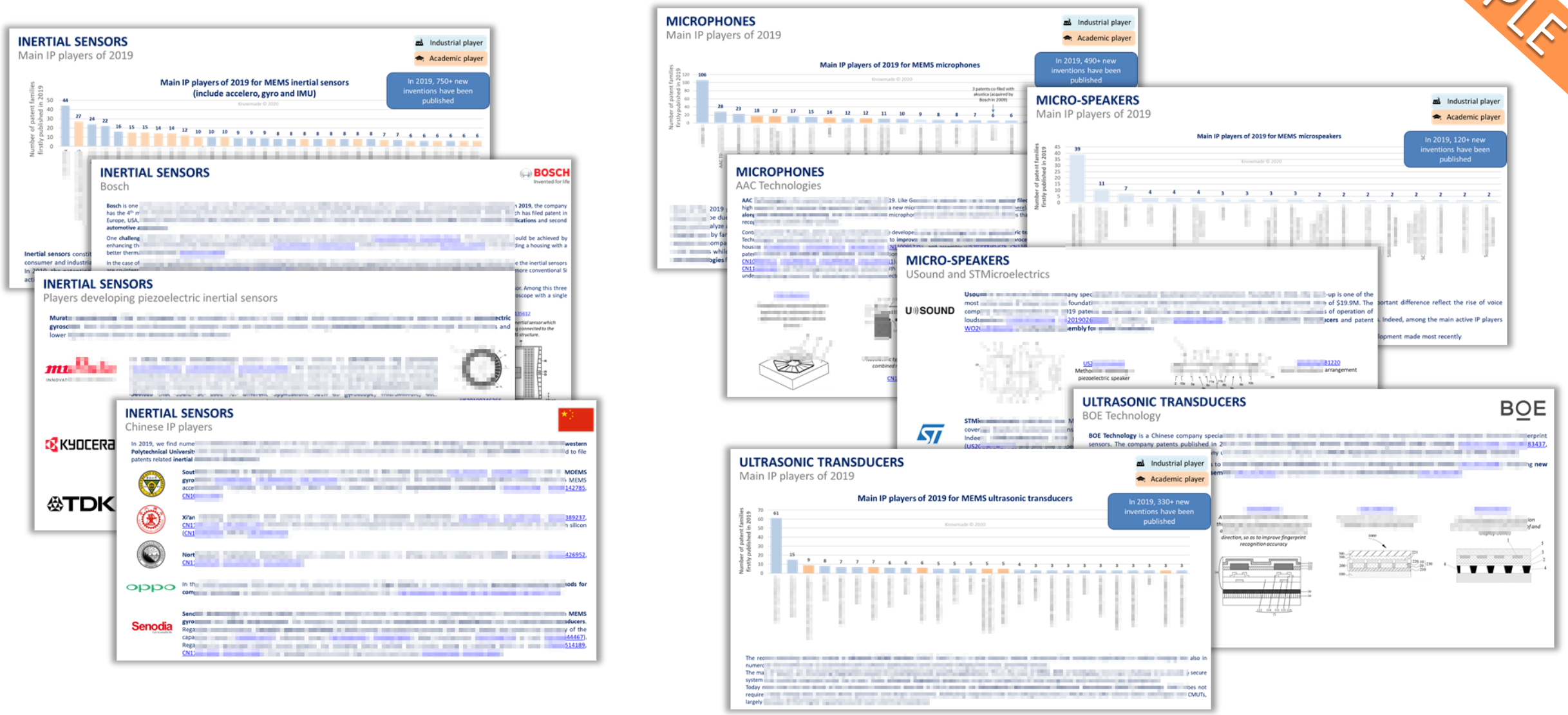
Identifying the most active IP players of the year

What are the most active patent applicants and what are their current developments



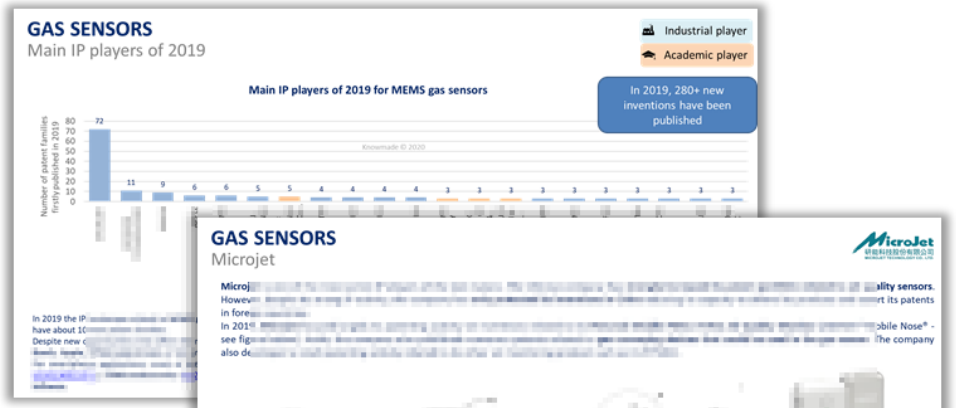
Understanding recent technological development

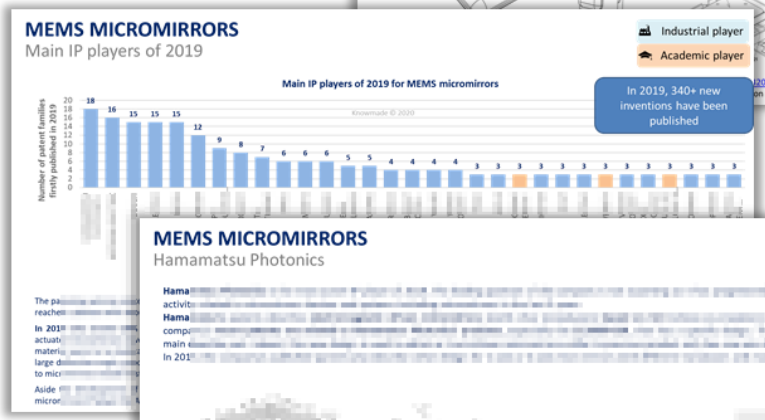
What are the patented technologies by MEMS devices

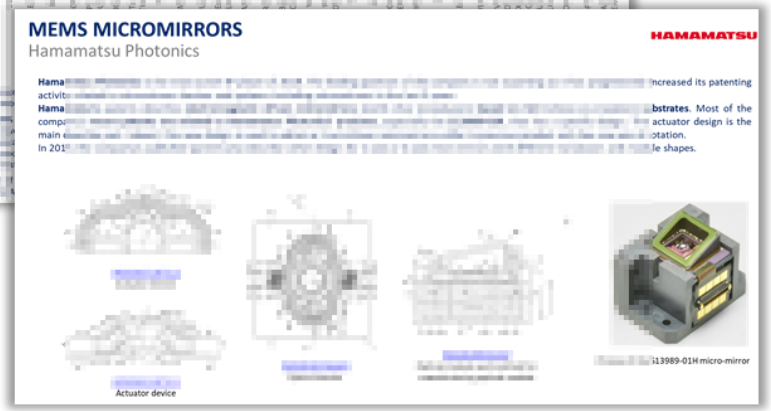


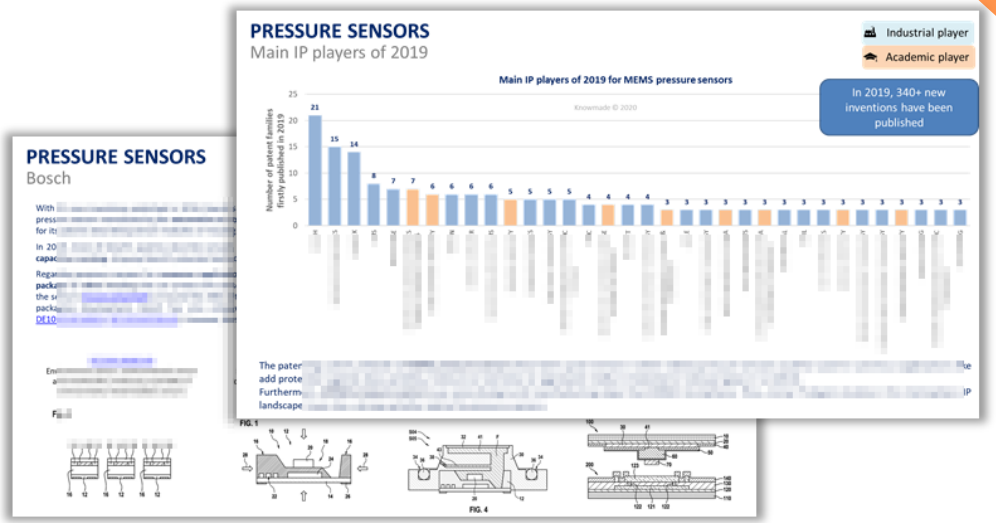
Understanding recent technological development

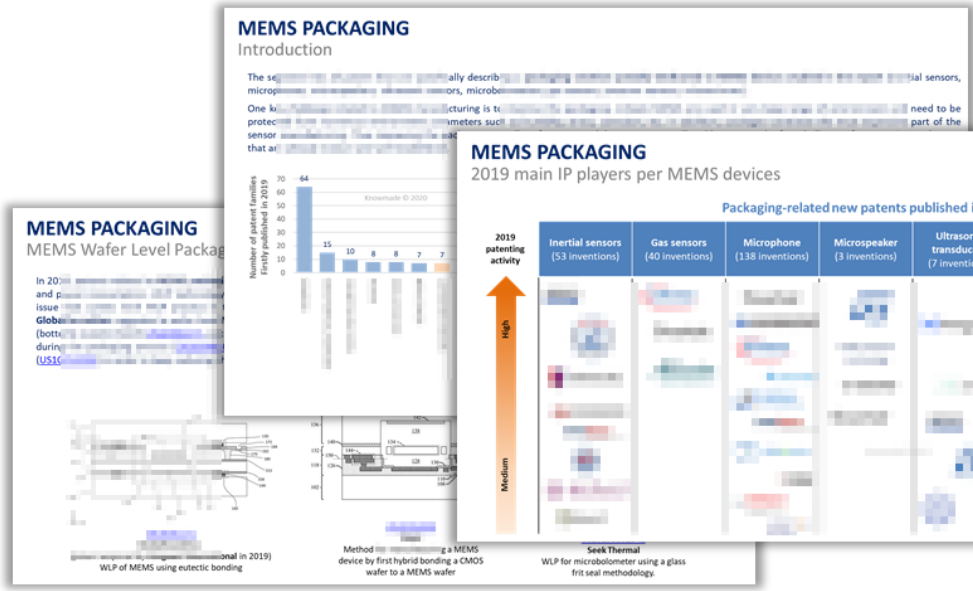
What are the patented technologies by MEMS devices









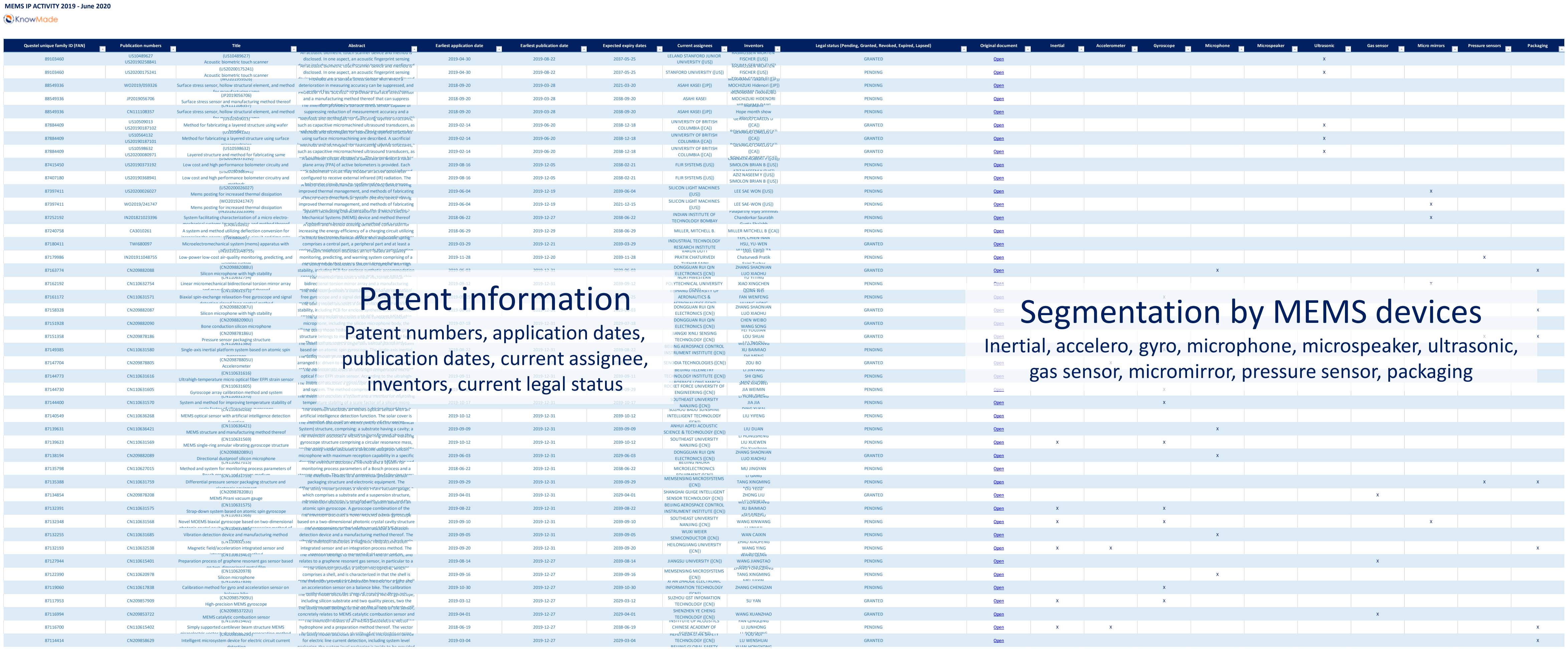


Patent database

Excel file containing all the patents analyzed in this report with corpus segmentation

SAMPLE

This **Excel database** allows multi-criteria searches and includes patent publication number, hyperlinks to the original documents, priority date, title, abstract, patent assignees, legal status and technical segment for each patent families.



ORDER FORM

MEMS Sensors & Actuators: 2019 Patenting Activity

Patent Landscape Analysis – July 2020

Ref.:KM20005

SHIP TO
Name (Mr/Ms/Dr/Pr):
_____
Job Title:
_____
Company:
_____
Address:
_____
City:
_____
State:
_____
Postcode/Zip:
_____
Country:
_____
VAT ID Number for EU members:
_____
Tel:
_____
Email:
_____
Date:
_____

PAYMENT METHODS

Check

To pay your invoice using a check, please mail your check to the following address**:**

KnowMade S.A.R.L.
2405 route des Dolines
06560 Valbonne Sophia Antipolis
FRANCE

Money Transfer

To pay your invoice using a bank money wire transfer please contact your bank to complete this process. Here is the information that you will need to submit the payment:

Payee: KnowMade S.A.R.L.
Bank: Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var, France
IBAN: FR76 1460 7003 6360 6214 5695 139
BIC/SWIFT: CCBPFRPPMAR

Paypal

In order to pay your invoice via PAYPAL, you must first register at www.paypal.com. Then you can send money to the KnowMade S.A.R.L. by entering our E-mail address contact@knowmade.fr as the recipient and entering the invoice amount.

RETURN ORDER BY

E-mail: contact@knowmade.fr
Mail: KnowMade S.A.R.L., 2405 route des Dolines, 06560 Valbonne Sophia Antipolis, FRANCE

PRODUCT ORDER

☐ **€2,990 – Multi user license**

For price in dollars, please use the day's exchange rate. For French customer, add 20% for VAT.

All reports are delivered electronically in pdf format at payment reception.

I hereby accept Knowmade's Terms and Conditions of Sale
Signature:

Terms and Conditions of Sales

DEFINITIONS

"Acceptance": Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by signing the purchase order which mentions "I hereby accept Knowmade's Terms and Conditions of Sale".

"Buyer": Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

"Contracting Parties" or "Parties": The Seller on the one hand and the Buyer on the other hand.

"Intellectual Property Rights" ("IPR") means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

"License": For the reports and databases, 2 different licenses are proposed. The buyer has to choose one license:

1. One user license: a single individual at the company can use the report.
2. Multi user license: the report can be used by unlimited users within the company. Subsidiaries are not included.

"Products": Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

"Seller": Based in Sophia Antipolis (France headquarters), Knowmade is a technology intelligence company specialized in the research and analysis of scientific and technical information. We provide patent landscapes and scientific state of the art with high added value to businesses and research laboratories. Our intelligence digests play a key role to define your innovation and development strategy.

1. SCOPE

1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. Any additional, different, or conflicting terms and conditions in any other documents issued by the buyer at any time are hereby objected to by the seller, shall be wholly inapplicable to any sale made hereunder and shall not be binding in any way on the seller.

1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorized person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when signing the purchase order which mentions "I hereby accept Knowmade's Terms and Conditions of Sale". This results in acceptance by the Buyer.

1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer's address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

2. MAILING OF THE PRODUCTS

2.1 Products are sent by email to the Buyer:

- within [1] month from the order for Products already released; or
- within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.

2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer.

The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including in cases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.

2.4 The mailing is operated through electronic means either by email via the sales department. If the Product's electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects.

2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer's risk.

3. PRICE, INVOICING AND PAYMENT

3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.

3.2 Payments due by the Buyer shall be sent by cheque payable to Knowmade, PayPal or by electronic transfer to the following account:

Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var, France
BIC or SWIFT code: CCBPFRPPMAR
IBAN: : FR76 1460 7003 6360 6214 5695 139

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «BCE» + 7 points, in accordance with article L. 441-6 of the French Commercial Code. Our publications (report, database, tool...) are delivered only after reception of the payment.

3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

4. LIABILITIES

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement

4.3 In no event shall the Seller be liable for:

a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;

b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.

4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.

4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.

4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation of the orders, except for non-acceptable delays exceeding [4] months from the stated deadline, without information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

5. FORCE MAJEURE

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

6. PROTECTION OF THE SELLER'S IPR

6.1 All the IPR attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.

6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company. The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

- Information storage and retrieval systems;
- Recordings and re-transmittals over any network (including any local area network);
- use in any timesharing, service bureau, bulletin board or similar arrangement or public display;
- Posting any Product to any other online service (including bulletin boards or the Internet);
- Licensing, leasing, selling, offering for sale or assigning the Product.

6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.

6.4 The Buyer shall define within its company point of contact for the needs of the contract. This person will be the recipient of each new report in PDF format. This person shall also be responsible for respect of the copyrights and will guaranty that the Products are not disseminated out of the company.

7. TERMINATION

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

8. MISCELLANEOUS

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party.

The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

9. GOVERNING LAW AND JURISDICTION

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Grasse, which shall have exclusive jurisdiction upon such issues.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.

KNOWMADE

Patent and Technology Intelligence

KnowMade
Patent & Technology Intelligence

KNOWMADE PURPOSE

Turning **patents** and **scientific information**
into **business-oriented report** for **decision makers** working in
R&D, **Innovation Strategy**, **Intellectual Property**, and **Marketing**

Competitive landscape | Technology trends | Opportunities / Risks | R&D and IP strategy

KnowMade

Intellectual Property ⟷ **Innovation Strategy**

Assert your patents

Defend your position in case of licensing/litigation

Evaluate the risks to infringe patents

Understand, anticipate and evaluate the competitive landscape and current technology developments

Improve your R&D and IP strategy

Identify and get access to external innovation

MAIN FIELDS OF EXPERTISE

Communication

- RF, microwave, mm-wave
- Datacom & Photonics
- Front end modules
- Antenna & Networks

Advanced Packaging
Innovative Materials
AI & Computing

Energy

- Power electronics
- Batteries & Fuel-cell
- Power management
- PV

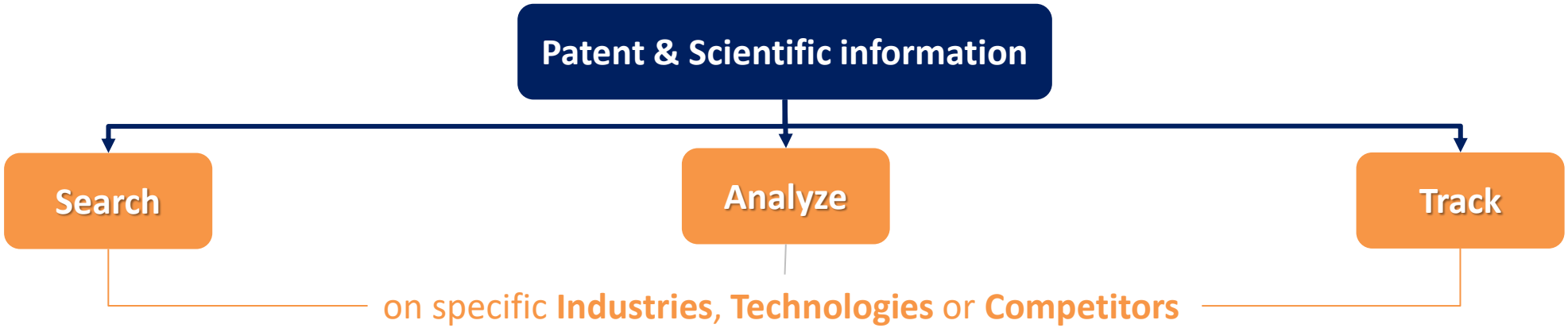
MEMS, Sensors & Optoelectronics

- Micro-systems
- Sensors & Imaging
- Lighting & Display

Life Sciences & Healthcare

- MedTech
- Microfluidics
- Biotech & Pharmaceutics
- Agrifood

KNOWMADE ACTIVITIES



Prior-art search

Evaluating patentability of invention
Invalidating third-party patents

Technology scouting

Are there patents or technologies to acquire? … that could be drawn on to improve my R&D?

Patent landscape analysis

Competitive & technology landscape analysis through patents: Who? What? Where? Since when? With who?

Freedom-to-operate

Am I free to sell my product without infringing third-parties IP rights?

Evidence of use (litigation/licensing)

Make the link between patents and product features

Patent valuation

What are the most valuable patents and what is their financial value?

Patent monitoring service

Monitor the IP activity: new applications, new granted patents, patents newly expired

Scientific watch

Monitor the Scientific activity

Competitor watch

Monitor the competitors R&D activities

KNOWMADE OFFER

Patent Reports
to give an overview on
IP dynamics, IP trends and IP players

Patent Monitors
to track current R&D activity and early detect weak signals, opportunities and risks

Tailor-made analyses

Meet customer's business needs and budgetary constraints

Off-the-shelf Reports and Monitors

Workshops and Trainings

Face-to-face meeting for direct interaction between your team and our experts at your site

KnowMade
Patent & Technology Intelligence

KnowMade SARL
2405 route des Dolines
06560 Sophia Antipolis, France

www.knowmade.com
contact@knowmade.fr